THE GENUS MIMULUS IN OR ADJACENT TO SINALOA, MEXICO

Howard Scott Gentry

In the course of naming my Sinaloa collections of *Mimulus,* it was found that only two species, *M. pallens* and *M. verbenaceus,* have been published as occurring in the Mexican state of Sinaloa. These are represented by two collections cited by Grant in her monograph of the genus (Mo. Bot. Gard. Ann. 11: 99–388. 1924). This paucity of material in a large genus that is known to range widely north and south of Sinaloa can also be detected in many other montane genera, for little mountain collecting has yet been done in that area.

The following list records the species now known to occur in Sinaloa, as based upon recent collections. Also included are several species which have been found adjacent to Sinaloa and hence can be expected to be found there as explorations continue. A provisional key is offered for ready determination of species in the area and to orient two entities proposed as new species. Following the key the species are annotated in alphabetical order.

Key to Species of Mimulus

Corolla red or orange-red, large, *ca.* 2 inches long (Sect. Erythranthe).
- Calyx teeth unequal; style included in calyx ..... 6. *M. Nelsoni*
- Calyx teeth equal; style exserted ..... 9. *M. verbenaceus*

Corolla yellow, sometimes red-spotted, less than 1 inch long.
- Calyx teeth equal, acute; style twice length of capsule (Sect. Paradanthus) ..... 3. *M. floribundus*
- Calyx teeth unequal, upper longer than others (Sect. Simiolus).
  - Calyx teeth three ..... 7. *M. pallens*
  - Calyx teeth five.
    - Flowers terminal, racemose; corollas 15 mm. long or more ..... 5. *M. guttatus*
    - Flowers axillary, usually solitary; corollas less than 15 mm. long.
      - Corolla lobes laciniate ..... 2. *M. dentilobus*
      - Corolla lobes not laciniate.
        - Calyx lobes broadly rounded, sometimes mucronate; plants usually over 10 cm. high ..... 4. *M. glabratus*
        - Calyx lobes triangular-acute, mucronate; plants less than 10 cm. high.
          - Calyx 7–8 mm. long in fruit; style long exserted; basal leaf blades all less than 1.5 cm. long; petioles narrow ..... 8. *M. Pennellii*
          - Calyx 9–10 mm. long in fruit; style included in fruiting calyx; some basal leaf blades 2 cm. long or more; petioles broadly winged, clasping the stem ..... 1. *M. calciphilus*

1. **Mimulus calciphilus** sp. nov. Annuus, ad basim multoramosus, 7–14 cm. altus; foliis ad basim aggregatis, late ovatis,

obtusis, undulati-dentatis, glandulosi-pilosis, 2.5–3.5 cm. longis, 2–3 cm. latis; petiolis brevidus alatis; pedunculis 2–4 cm. longis; calyce angulati-urceolato, pubescenti, circo 1 cm. longo, dente supremo 3–4 mm. longibus, dentibus lateralibus 1 mm. longis, ventralibus 1.5–2 mm. longis; corolla 1 cm. longa, flava, lobis inequalibus, eis lateralibus dorsali quam brevioribus; antheris glabris, inclusis; stylo glabro, incluso; capsula ovati-subglobosa, subsessili.

Small mesophytic annual 7–15 cm. high with a basal rosette of large, broadly ovate leaves and wide-winged petioles; stems scapose, pubescent, shallowly sulcate, bearing 1–2 pairs of leaf-like bracts; leaves radical, 2.5–3.5 cm. long, 2–3 cm. wide, 5–7-nerved, villous on both surfaces, undulate-denticulate, obtuse, broadly decurrent making a winged petiole; pedicels 2–4 cm. long, axillary from radical leaves or from the denticulate leaf-like bracts on the scape, simple, glandular-villous; calyx accrescent, 8–11 mm. long, angulate-urceolate, sparsely glandular villous, red-tinged in maturity, the lobes triangular-acute; upper lobe 3–4 mm. long, lateral lobes 1 mm. long, ventral lobes 2 mm. long and often folding over lateral lobes; corolla about 1 cm. long, yellow, the limb short; lobes rounded, equal, 1 mm. long, 2 mm. broad; stamens glabrous, included in corolla; stigma broadly lanceolate-lobed, the lobes subequal; style glabrous, included in fruiting calyx; ovary glabrous, short-stipitate; capsule oblong, subsessile, 5 mm. long.

Type. Near Los Pucheros, at about 6500 feet elevation, Sierra Surotato, Sinaloa, Mexico, March 17–24, 1945, *Gentry 7217* (Univ. of Mich. Herbarium; isotypes to be distributed).

This species appears to have no close relative in North America. It belongs in the section Simiolus and in Grant's monograph (*op. cit.*, p. 145) keys to *M. Whipplei*. The radical leaves with broadly winged petioles and five to seven veins, the larger calyx, equally lobed corolla, and the included style and stigma are only some of the more important characters distinguishing it from *M. Whipplei* and other members of the genus. The flowers are persistent for a *Mimulus*. With its basal rosette of leaves and scapose stem flanked by rather sinuous pedicels holding the large semi-nodding calyces, *M. calciphilus* presents a singular appearance. The only observed occurrence of the species is the small compact colony in rich humus soil of the talus slope footing the calcareous crags (whence the specific name) known locally as Los Peñascos.

2. Mimulus dentilobus Rob. & Fern. Proc. Am. Acad. Sci. 30: 120. 1895.

Mimulus dentilobus is a small, delicate, finely cut plant, the small heads not reaching more than 3 to 4 inches in height. If

the plants are observed closely, the laciniate corollas are visible to the naked eye and they serve at once to identify the species.

This is a rarely collected species known previously from southern New Mexico, southern Arizona, Sonora, and from above Puerto Escondido in the Sierra Giganta in the southern part of Baja California. Recently it has been collected in the Sierra Surotato, northern Sinaloa, in a cave near Los Pucheros at about 6500 feet elevation (*Gentry 7220*), growing in a tight mass on bare igneous rock kept moist by dripping water. Cattle had access to the cave and had stripped off the succulent moist carpet as high as they could reach.

3. Mimulus floribundus Dougl. in Lindl. Bot. Reg. pl. 1125. 1828.

A cespitose plant, the stems slender, pilose, often decumbent and rooting at the nodes, sometimes reaching 30 cm. in height but usually shorter. A rather slimy or wet-viscous herb. Corolla yellow with reddish spots in the open throat.

In western North America this species is known from British Columbia to Jalisco, Mexico (*Mexia 1853*). In Sinaloa, as indicated by the following collections, it appears to be common through the cerro and valley region of the Sierra Madre piedmont: Varomena, *Gentry 7147;* Puerto a Tamiapa, *Gentry 5866a;* Cerro Colorado, *Gentry 5469;* San Blas, *Rose, Standley & Russel 13395.*

4. Mimulus glabratus H.B.K. Nov. Gen. & Sp. 2: 370. 1895.

This species as interpreted by Grant (*op. cit.*) is a wide-ranging highly variable perennial herb. Grant cited it from several states in Mexico north, south, and east of Sinaloa. There are, however, no known collections from Sinaloa, but further explorations should reveal it there.

5. Mimulus guttatus DC. Cat. Hort. Monsp. 127. 1813.

There are no known collections of this species from Sinaloa, but since it has been found in adjacent Sonora (*Gentry 1305,* Carnegie Inst. Publ. no. 527: 237. 1942) and Chihuahua (*Gentry 2780, loc. cit.*), it doubtless occurs in northern Sinaloa.

6. Mimulus Nelsoni Grant, Ann. Mo. Bot. Gard. 11: 144. 1924.

This species is known only from the adjacent state of Durango, "30 miles north of Guanaceri [Guanaceví], Sierra Madre (*Nelson 4775*)." This locality is close to the Sinaloa-Durango boundary.

7. Mimulus pallens Greene, Leafl. Bot. Obs. & Crit. 2: 4. 1909.

This species is distinguished by the three-toothed calyx. The yellow flowers are spotted red in the open throat. It forms showy

colonies 15 to 25 cm. high along streams. It appears to be restricted to a riparian habitat and is rather common through the higher elevations, only rarely dropping below the lower limit of oaks. It is a Sierra Madre species known previously from Sonora, Chihuahua, and Durango. The following Sinaloa collections have been made: Los Pucheros, Sierra Surotato, *Gentry 7213, 7232;* above La Jolla, Sierra Surotato, *Gentry 7285;* all of the collections were made in March when the plant was in full bloom.

8. **Mimulus Pennellii** sp. nov. Annuus vel perennis; caulibus procumbentibus, 6–12 mm. longis, sparsim villosis foliis late ovatis, dentatis acutis, petiolatis, supra villosis, infra glabris, 6–10 mm. longis, 8–12 mm. latis; pedunculis axillaribus, 1.5–3 cm. longis; calyce 6–8 mm. longo, puberulenti, dentibus triangularibus, acutis, inequalibus, dente supremo alteris plus quam duplo longiore; corolla 8–9 mm. longa, flava; staminibus glabris, inclusis; stylo glabro, laciniis aequalibus, exsertis, ligulatis; capsula ovata, attenuata, subsessili; seminibus levibus fuscis.

Small annual or perennial aquatic herbs 5–8 cm. high, cespitose, rooting at the nodes, the leaves petioled and calyces narrow. Stems procumbent, slender, sparsely pilose, glabrate, reddish, the internodes 1–3 cm. long; leaves petiolate, the petioles 2–6 mm. long, blades 6–10 mm. long, 8–12 mm. wide, broadly ovate to triangular-ovate, dentate, 5-nerved, minutely scabrous, glabrate or glabrous below and villous above; peduncles axillary, single, 1.5–3.0 cm. long, pubescent near the base; calyx weakly accrescent, 6–8 mm. long, narrowly funnelform or strictly campanulate, ascending-strigillose within, sparsely pubescent outside and rather lucid, the lobes triangular-acute, upper 2–3 mm. long, the others 1–2 mm. long, the ventral folding over weakly in maturity; corolla 8–9 mm. long, yellow with red-spotted throat, the lobes rounded, spreading; stamens included, glabrous; stigma lobes subequal, broadly lanceolate; style flat, minutely striate, glabrous, exserted beyond fruiting calyx; ovary glabrous, subsessile; capsule narrowly ovoid-terete, broadly lobate between the sutures, the margins of the lobes undulate; seeds light brown, ovoid-orbicular, somewhat depressed.

Type. Rancho Africa, elevation 2000 to 3000 feet, Sierra Tacuichamona, Sinaloa, Mexico, February 19, 1940, *Gentry 5691* (Univ. of Mich. Herbarium; isotypes in the following herbaria: Gray, Univ. Ariz., Univ. Calif., Stanford Univ., Mo. Bot. Gard., N. Y. Bot. Gard., Inst. Biol. Mex., Gentry).

This diminutive hydrophyte formed a loose mat on a large water-covered rock in tropical montane forest. In Grant's monograph it keys to *M. glabratus,* but is distinguished from that broad far-flung complex by the petiolate upper leaves and particularly by the rather narrowly triangular acute calyx lobes. It is named in honor of Francis W. Pennell, authority on the family.

9. Mimulus verbenaceus Greene, Leafl. Bot. Obs. & Crit. 2: 2. 1909.

The natural habitat of this species is montane in the origins of streamways, such as rocky seeps and waterfalls in canyons where permanent moisture is available. In such situations it is often found in low bushy clumps. Occasionally it occurs in a less cespitose form along the lower river courses, as near Fuerte, but the seasonal floods sweeping such rocky river beds alternately initiate and destroy lowland adventives of the species.

Known from the Grand Canyon, Arizona, to northern Sinaloa. Sinaloa, Mexico: above La Jolla, Sierra Surotato, *Gentry 7284;* sandy soil along the river near Fuerte, *Rose, Standley, & Russel 13074.* Grant (*op. cit.,* 144) cites Sierra de Alamos as in Sinaloa. This is an error since that mountain is in Sonora.

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LOCATION OF EXTRANEOUS MATERIALS IN REDWOOD

Irving H. Isenberg

This paper is one of a series originating from the laboratories of The Institute of Paper Chemistry, Appleton, Wisconsin, and covering a fundamental study of the botanical, chemical and other characteristics of the California redwood (*Sequoia sempervirens*); this work has been sponsored by The Pacific Lumber Company, Scotia, California.

In order to study the location of extraneous materials in redwood and the effect of certain treatments on these substances, microsections (20 μ thick) were made from the following locations in a redwood tree—namely, outer portion of heartwood, sapwood, junction of sapwood and heartwood, and rootwood. The major portion of the work was done on the heartwood sections. The treatments used on the various sections and the results obtained are, for the most part, described briefly in Table 1.

Heartwood

In the heartwood the extraneous material is located chiefly in the cell cavities of the wood ray parenchyma and the longitudinal parenchyma but may also be present in the walls of these cells as well as in the walls of the tracheids, the only other type of cell structure present in redwood (pl. 1, figs. 1, 2). This extraneous material includes mainly dead protoplasm, proteins, starch, tannins, phlobaphenes, and fats, and is dark red in color, especially in the longitudinal wood parenchyma cells.

The reaction of the cell contents to the various reagents, as